Effects of Pulsed-Electrodeposition Parameters on the Property of Aluminum Film onto Sintered NdFeB Magnets

Fang Xu¹, Li Jiang^{1,2,*}, Jianhu Wu¹, Xiting Shen¹, Qiyun Huang¹, Yundan Yu¹, Chunan Cao², Guoying Wei¹, Hongliang Ge¹

¹College of Materials Science and Engineering, China Jiliang University, Hangzhou, China;

²Department of Chemistry, Zhejiang University, Hangzhou 310027, China

*E-mail: jiangliwhu@126.com

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The aim of this study is to investigate the pulse-electrodeposition parameters on the property of aluminum (Al) film onto sintered neodymium-iron-boron (NdFeB) magnets at room temperature from acidic AlCl₃-1-ethyl-3-methylimidazolium chloride (AlCl₃-EMIC) ionic liquid (2:1 molar ratio AlCl₃-EMIC). The effects of pulse frequency and duty ratio on the surface morphology, particle size, thickness, hardness, deposition rate, preferred orientation of Al grains and corrosion resistance of the Al films were researched. The results show that the increase of duty ratio can promote the deposition rate, particle size and relative surface roughness of Al films; while the increase of pulse frequency can accelerate the deposition rate of Al film and reduce its particle size and relative surface roughness. The optimum Al film with a smooth surface and good corrosion performance were obtained at the condition of $i_p=12.5$ mA/cm², $r = 0.5$, $f = 5$ Hz.

Keywords: NdFeB magnets; Pulse-electrodeposition; Aluminum; Ionic liquid

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